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Software Engineering Institute

Pittsburgh, PA 15213-3890

Findings from the CMMI Transition Workshop — Mechanisms for Navigating the Road to CMMI

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Transition Workshop



The Road to CMMISM: What Works, What's Needed

- organized by the Accelerating Software Technology Adoption (ASTA) Initiative as a pilot “Technology Transition Workshop” .
- sponsored by the CMMI Project Manager.
- held May 30, 31, and June 1, 2001 in Pittsburgh.
- designed to explore successful practices for accelerating an organization's transition to the CMMI Product Suite.
- a Technical Report describing the workshop in detail is in the works



Why a CMMI Workshop?



The Workshop was developed to address:

- Expanding and testing the SEI CMMI Team's definition for "Whole Product".
 - What is needed beyond core products for transition?
- Pilot users' need to baseline and share with others.
 - Who has been successful with what?
 - What has been developed to meet organizational needs?
- Start a "community of interest" for sharing CMMI experience.
- Begin to understand "non-users" issues and questions about CMMI.



Participants

Mike Bloom

- Mitre/ESC

Bruce Boyd

- The Boeing Company

Hank Eyester

Geoffrey Draper

- Harris Corp

Jeffrey Dutton

- Sverdrup Technology

Alison Ferraro

Mary Gregg

Wayne Sherer

- U.S. Army TACOM/ARDEC

Winifred Menezes

- Q-Labs Inc.

SuZ Garcia

- aimware & SEI

Ronald Ulrich

Kanji Miyao

- TRW

Alan Pflugrad

- Northrop Grumman (Litton/PRC)

Bill Peterson

Mike Phillips

Pamela Curtis

Dave Kitson

Gene Miluk

- SEI CMMI Team



Participants Pre-Workshop Papers ¹

- *Integrating Process Maturity Reviews into Project Management Reviews makes progress toward process maturity part of the normal way of managing in an organization.*
- *CTC National Security Division's transition from the S-CMM to CMMI-SE/SW while shifting the focus from CMM's to ISO 9001/14001 QMS/EMS and PMBOK by mapping from these documents to the CMMI to ensure coverage.*
- *CMMI transition strategy and roadmap at Harris Corporation, building on an extensive history of CMM-based process improvement.*
- *Report from a CMMI Working Group during the High Maturity Practices Workshop identified and discussed assumptions and eight issues for high-maturity organizations when transitioning to or using CMMI.*
- *Litton-PRC's experience with SE-CMM, SW-CMM and their transition to CMMI.*



Participants Pre-Workshop Papers ²

- *CMMI framework as a way to integrate several process improvement initiatives for Mitre and ESC/EN*
- *Barriers to and recommendations for speeding the adoption of CMMI, together with some useful techniques*
- *A review of the CMMI Product Team's Communication Plan.*
- *Sverdrup Advanced Systems Group's experience in starting with an early version of CMMI (S/W-CMMI) to CMMI-SE/SW Level 3.*
- *Mechanisms to reduce the long days, the cost and time of assessments, while retaining high accuracy and repeatability.*
- *A description of transition mechanisms used to implement CMMI in an Army organization, organized by functional area, with lessons learned from developing and applying them*



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What We learned before the Workshop

An Online survey was made available to anyone visiting the Technology Transition Workshop website.

Number of respondents = 161



Pre-Workshop, On-line Survey ¹

Online survey available to anyone visiting the workshop website.
Number of respondents = 161

What size organizations are moving to CMMI

- Respondents' organizations ranged in size from 2 to 72,000, with a median of 350 and an average of 3369.

What is the stimulus/motivation for doing so?

- A common theme among the few who answered this was "multi-discipline" and "required," "Competitive edge" and "quality" also were mentioned. From the question that asks about "expected benefits", "Multi-discipline" and "Quality" were the significant keyword/theme leaders

What models are organizations migrating from?

- SW-CMM, ISO9000, "other", ISO/IEC 12207, SE-CMM. Six companies listed early versions of CMMI under the 'other' category. Most companies are using two or more models.



Pre-Workshop, On-line Survey ²

What strategy are they using for CMMI implementation?

- **Methods:** Nearly half of the respondents are either “Not Sure” of their plan or have “No Plan Yet.” Of those with a plan, “CMM leverage,” “Study/Learn,” “Assessments,” and “Business-based Prioritization” were the most frequently cited strategies. About half of those who will leverage CMM plan to finish a specific CMM level before proceeding to CMMI.
- **Duration/Effort, to accompany ‘methods’:** One-half did not provide duration/effort estimates. Of those that responded, the transition is expected to take (on average) 18 months and 88 person-months of effort.



Pre-Workshop, On-line Survey ³

Are/will they implement staged or continuous?

General note: Only six responses. It appears from this question (and from numerous other text responses) that organizations are struggling to decide between the two representations

- **Reasons for staged:** Senior managers and customers understand this easier. We have conducted our own informal survey among our current and potential customers, as well as among government contracting organizations. Based on what we are hearing, we currently do not see a market for the continuous representation. At first view, Staged seems to best meet our needs.
- **Reasons for continuous:** The ability to choose a PA based on business objectives in the continuous view. Our approach is to improve capability continuously rather than reach a maturity level. Some process areas are important for us and some not. May include both representations when we consider the "software factories" at our geographically separated units.



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Here is What You Told Us...

Online survey available to CMMI Conference attendees registered on NDIA database as of October 16, 2001.

64 respondents out of possible 101 registrants



Pre-Conference, On-line Survey 1

Size of the organizations moving to CMMI:

- Respondents' organizations ranged in size from 8 to 65,000, with a median of 350 and an average of 4680.
- The median size of the portion of the organization working in software/systems was 200, with a minimum of 0 and a maximum of 60000. (The average was 2237)

• Type of organizations involved:

- 50% of respondents were defense or other government contractors
- 20% were DoD or military
- 9% were commercial, such as banking, utilities, industrial automation, automotive, food
- 10% were "other," such as consulting, research & development



Pre-Conference, On-line Survey ²

Types of work are the organizations involved in:

- 56% of respondents work in Software & Systems Engineering
- 13% work in Software Engineering organizations
- 6% work in Systems Engineering organizations
- The remainder (25%) work in “other” organizations, such as acquisition (9%), consulting (5%), financial, product development, project management.

Maturity Level:

- 57% of respondents work in Level 1-2 organizations
- 25% work in organizations approaching or at Level 3

Familiarity with CMMI:

- Over half (54%) of the respondents could be considered as “very familiar” with CMMI – 31% have been following development for a few years and 23% have been assisting with development.
- 38% are just looking into CMMI and 8% are “newbies”
- As would be expected, those with greater familiarity are further along the decision making path



Pre-Conference, On-line Survey ³

What is the stimulus/motivation for moving to CMMI?

- 44 supersedes SW-CMM
- 43 competitive advantage
- 31 customers requiring CMMI
- 29 wanted SW/SE integration
- 29 capability levels
- 16 supersedes EIA 731
- 10 provides a measurement focus
- 9 Other:
 - o Keep abreast of clients' interests (consulting)
 - o Integration of disciplines and improving the overall processes
 - o Need for structure and order in the organization.
 - o Acquisition
 - o General process improvement.
 - o Match maturity/capability with vendors



Pre-Conference, On-line Survey 4

What evidence of success will be expected ?

- 28 ROI
- 17 Quality/Customer Satisfaction
- 10 predictable cost & schedule
- 7 increased sales/market share
- 5 staff retention/employee satisfaction
- 4 reduced cost
- 4 implementation ease/speed
- 3 contract awards
- 3 reduced rework
- 3 increased productivity
- 2 reduced cycle time
- 2 customer requirement/management commitment



Pre-Conference, On-line Survey 5

What models are organizations migrating from?

On average, organizations are using 3 of the listed models. The minimum number being used is 0 and the maximum 12.

- 44 SW-CMM
- 31 ISO 9000
- 19 Six Sigma
- 15 EIA/IS 731
- 14 ISO/IEC 12207
- 10 SE-CMM
- 9 IPPD
- 9 other
- 7 SA-CMM
- 7 P-CMM
- 6 SECAM
- 5 ISO/IEC 15288
- 4 Baldrige
- 2 ISO/IEC 15504
- 2 FAA iCMM
- 1 ISO 15939



Pre-Conference, On-line Survey ⁶

Are/will they implement staged or continuous?

- **20 Staged**
- **15 Both**
- **18 Continuous**
- **10 Not sure**



Pre-Conference, On-line Survey 7

What strategy are they using for CMMI implementation?

- 35% of respondents will map their existing plans to a CMMI implementation
- 25% are starting from scratch
- 24% will conduct a CMMI assessment and gap analysis to create an action plan
- 9% will finish to a current milestone and then create an implementation plan
- As might be expected, the majority of “start from scratch” plans are by Level 1 organizations. Beyond that, there is nothing that particularly distinguishes strategies based on current maturity level.



Pre-Conference, On-line Survey ⁸

What products from the CMMI product suite have they found to be useful?

- 49 use the CMMI model
- 40 use personal contacts
- 30 browse CMMI websites
- 29 use CMMI training courses
- 28 listen to CMMI presentations
- 11 find SCAMPI appraisals useful
- 11 use the CMMI tutorial CD
- 8 find information on the internet
- 7 other



Workshop Outputs

During the workshop, participants discussed their experiences implementing CMMI at their organizations. The group identified and evaluated:

- Some 30 traps and timewasters.
- Over 60 best practices for adopting the product suite
- About 40 mechanisms that they felt were needed

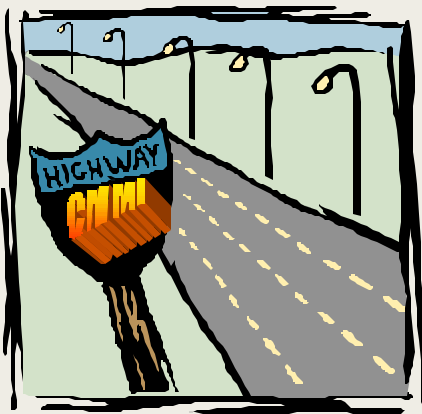
These findings are expected to enable future adopters to make more effective technology transitions, as well as target some problem areas for the larger CMMI community to address.



Workshop Outputs



- **Traps and timewasters**
- What works
- What's needed





Traps and timewasters ¹

These are the things that were or could have been blind alleys, dead-ends...

The question put to attendees was: If you were to recommend mechanisms for CMMI-based improvement to your competitor, what would those be?



Traps and Timewasters ²

- Have SEPG meetings with no project representation (13)
- Overdo documentation (e.g. write 100 page procedure) when going from SW-CMM to CMMI (12)
- Don't link process to product quality, cost, schedule, & performance (12)
- Rely on current *Introduction to CMMI* training as sufficient for assessment team training (10)
- Let experts/zealots write the procedures (10)
- Set artificial level requirements, and put the people with the lowest estimate in charge (9)
- Spend most of your time on the open-ended questions during a SCAMPI assessment (9)



Traps and Timewasters ³

- Don't train – it costs too much. Just do it – follow the assessor (8)
- Management should dictate process changes without any coordination, because it speeds things up (8)
- Don't bother to capture the hearts and minds of middle management (8)
- Select your most important (e.g. crucial) project as your CMMI pilot – get biggest bang for your buck (8)
- Change the organization structure 6-months before the assessment, to clarify reporting structures (8)
- Include zealots in specific areas (like measurement, international standards) in your assessment team (7)
- Tell people they can understand the model just by reading it (7)



Traps and Timewasters 4

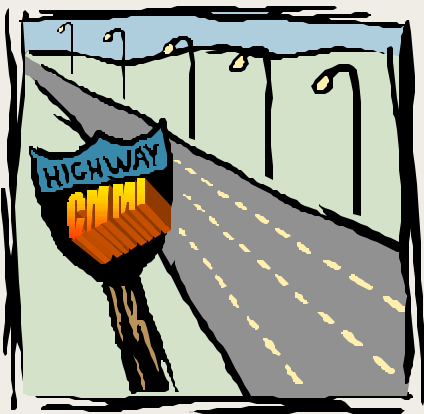
- Align your practices exactly to the CMMI, instead of to what you do (6)
- Use a benchmark method (e.g. Class A assessment) for first contact (5)
- Put as many lead assessors on your assessment team as possible. Different opinions add spice! (4)
- Forget the “I” phase in IDEAL model (4)
- Introduction to CMMI course as first contact for program managers (4)
- Rotate your SEPG leader every three months – use someone with a fresh look who has never read the policy (4)



Workshop Outputs



- Traps and timewasters
- **What works**
- What's needed





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The Workshop Focused on Transition Mechanisms

In the work ASTA does with transition planning and technology introduction, a *mechanism* is anything in addition to the core technology that is needed or useful to get the technology into use as intended.

“A transition mechanism is the means by which information, procedures, or skills are communicated. The first category is information dissemination. Examples range from marketing brochures and advertising to engineering handbooks. The second category is technology implementation, where the objective is to alter attitudes or behavior, including new skill sets. Examples here include training courses, revised reward systems, and policy change.”¹

And...

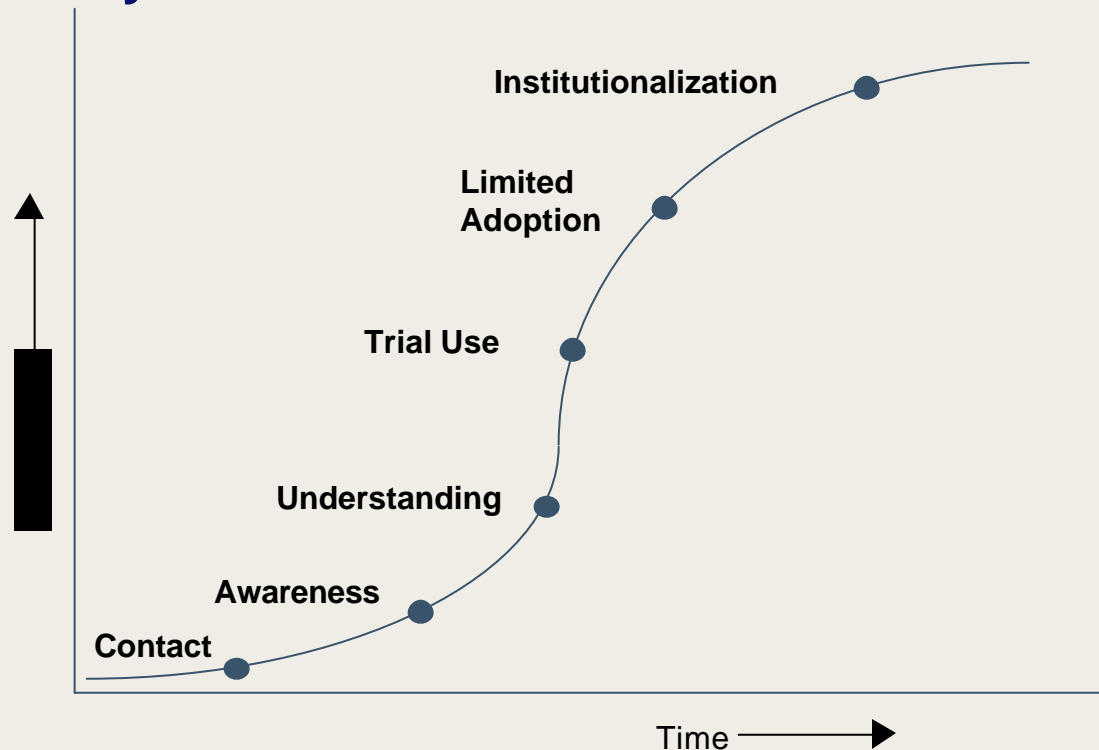
¹ Fowler and Levine, *A Conceptual Framework for Software Technology Transition*, 1993.



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How Organizations Commit to Change*

These stages were used in the workshop to classify mechanisms:



* Daryl R. Conner and Robert W. Patterson. "Building Commitment to Organizational Change," *Training and Development Journal* (April 1983):18-30.



What Works

Mechanisms used in the implementation of CMMI.

These are Mechanisms that organizations developed for themselves, or that were available from the SEI, other organizations, or transition partners.



What Works: Pre-Conference, On-line Survey

What products from the CMMI product suite were useful?

- 49 respondents stated the CMMI model
- 40 use personal contacts
- 30 browse CMMI websites
- 29 use CMMI training courses
- 28 listen to CMMI presentations
- 11 find SCAMPI appraisals useful
- 11 use the CMMI tutorial CD
- 8 find information on the internet
- 7 other



What Works: Contact / Awareness

- Think CMMI Program: reference cards; promotional materials (14)
- Translations of SEI Material into local language (8)
- Establishment of multiple communication channels about CMMI (4)
- CMMI awareness briefings/forums (3)



What Works: Understanding

- Self-assessment; gap analysis; mini-assessments; “Class B” & “Class C” assessments that relate gaps to the organization’s processes (20)
- Chart that describes the process responsibility of different roles across organizational boundaries (11)
- Poster on CMMI (7)
- Transition “Road Map” (7)
- CMMI action plans (4)
- BoF on focused topics (4)

Note: cross-model maps didn't get many votes!



What Works: Trial Use

- Integrating QA to measure CMMI process improvement progress (8)
- Linkage of the QA process to CMMI (8)
- A transition strategy for SW-CMM-->CMMI (8)
- Pilots/trials in non-development areas (7)
- Example CMMI process improvement budget (5)



What Works: Limited Adoption

- Role-based training (24)
- Tailoring guidance/strategies for different organizational Contexts (23)
- Transition steering group (10)
- ROI trend data (9)
- Integrating all disciplines into the process group (8)



What Works: Institutionalization

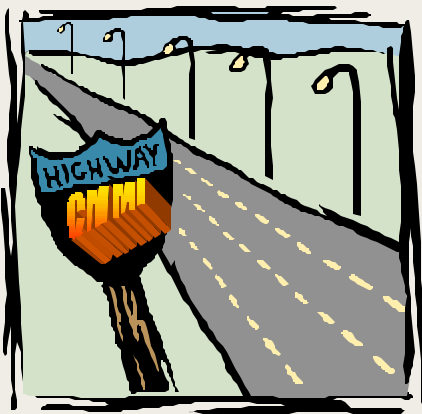
- CMMI Best-Practice Based
Templates/Checklists/Assets (22)
- Integrating Process Reviews into Project Management
Reviews (14)



Workshop Outputs



- Traps and timewasters
- What works
- **What's needed**





What's Needed

These are mechanisms that participant organizations wanted, but didn't have.

Working to bring these about would have made the transition job easier, according to these organizations.



What's Needed: According to the Pre-Workshop, Online Survey

What additional things (that may not currently exist) are needed to implement CMMI?

- **Overall:** “Maps, Guides & Tools” summarizes what is most-needed in the implementation of CMMI.
- **People:** “Training & Training Materials” was listed as most-needed.
- **Other frequently-occurring categories were:**
 - **Practitioner Community** – leveraging SPIN's, white papers, chat rooms.
 - **Examples** – lessons learned, case studies.
 - **Methods** – “how to” transition, improved assessment methods (including assessor ‘conversion’), metrics.
 - **Clarity / Consistency / Definition** – fewer interpretation issues, clarity on continuous vs. staged, address different sectors more clearly, version stability.
 - **Benefits** – ROI, cost forecasting, visibility in industry press.



What's Needed: Contact/Awareness

- Widely published list of organizations who have decided to transition/use CMMI for source-selection (21)
- A clear vision of what CMMI is (11)
- Integrated product suite across the adoption spectrum, whole product (11)
- Well-written PR material targeting senior managers, project managers and systems engineers (10)
- Web-based transition mechanism linker (e.g. Amazon.com model) (8)
- Clear and unambiguous statement from DoD on what their intentions are for using CMMI for both government and contractor organizations (8)
- Statistical-based information to demonstrate that benefit is being derived from CMMI use (7)



What's Needed: Understanding

- Technical sales pitch, what is the promise of CMMI (10)
- Supported class C assessment method for projects (9)
- Rewrite other CMM TRs for CMMI usage, especially metrics (7)
- Expert evaluation of implementation and artifacts for CMMI (5)
- CMMI version of Mastering Process Improvement and PCM Method (3)
- Guidelines for using Core/Common PAs in areas not covered by CMMI (2)



What's Needed: Trial Use

- "Tailored transition guides" for different transition paths (8)
- Guidelines for establishing and mapping the organization's process architecture consistent with organization's culture & CMMI (6)
- Mapping of organizational roles to CMMI goals and practices (6)
- Project supported class B assessment method (7)
- Design guide for pilots that maximizes adoption (5)
- Organizational mentoring program (5)
- ROI calculator (4)



What's Needed: Limited Adoption

- Adoption guide by organizational characteristics (domain, size, market...) (8)
- DoD CMMI assets library (policies, procedures, sharing mechanisms) (7)
- Materials to enable people to become CMMI SMEs (black belt) (6)
- Training “starter kit” with training design content and role-specific training recommendations (6)
- Modern/alternative training mechanisms for CMMI (CBT, VTC, Web-based) (6)
- Website of assets needed for assessments – SCAMPI materials (4)
- Method and technology for continuous process assessment / evaluation (4)



What's Needed: Institutionalization

- Strategic plan from CMMI Steering Group for transition and product evolution (5)
- Incorporation of CMMI content into Defense Acquisition University curriculum (5)
- Guidelines for negotiating interfaces based on customer and supplier relative process maturities (3)
- certification process for CMMI assessments (3)



What's Needed According to the *Pre-Conference, Online Survey*

What additional things (that may not currently exist) are needed to implement CMMI?

- **Contact/Awareness:** Concise descriptive materials, well integrated product suite, credible evidence, web-based interface.
- **Understanding:** Boilerplate presentations, class C appraisal, gap analysis, integrate CMMI into courses.
- **Trial Use:** tactical guideline for tailoring, ROI methods, tailorable templates, guidelines for pilots.
- **Limited Adoption:** methods for appraisal fidelity, strategic plan, guidelines for interface management.
- **Institutionalization:** Tailorable guidelines & templates, web, assets for subject matter experts, continuous assessment methods.



The Road to CMMI... 1

The workshop showed ~

- That many of the products in the product suite are useful and are being used
- Many more mechanisms than are in the product suite are being used by organizations who are transitioning to CMMI
- Mechanisms may come from many places
 - the organization
 - SEI CMMI product team
 - third parties
- Some mechanisms may actually prevent transition



The Road to CMMI... 2

The workshop showed ~

- Early adopters' experience can point the way for others who don't want to re-invent common mechanisms in order to transition
- There's a rich opportunity to develop mechanisms to support organizations on the road to CMMI

